SCIENCE

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FRIDAY, AUGUST 11, 1899.

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MSS. intended for publication and books, etc., intended for review should be sent to the responsible editor, Professor J. McKeen Cattell, Garrison-on-Hudson, N. Y.

THE COLUMBUS MEETING OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

As SCIENCE has already announced, the 48th Annual Meeting of the American Association for the Advancement of Science will be held from the 21st to the 26th of the present month, under the presidency of Professor Edward Orton, at Columbus, Ohio, in the buildings of the Ohio State University. By certain members of the Council at the Boston meeting last year it was thought that the acceptance of the invitation from Columbus, involving the rejection or postponement of the acceptance of an urgent invitation from Philadelphia, was hardly wise in view of the fact that they hoped that with the Boston Anniversary Meeting a period of renewed prosperity would begin with a series of large and enthusiastic meetings. Nevertheless, the vote in favor of Columbus showed that a large majority of the members of the Council were impressed by the arguments presented by Professor B. F. Thomas, who laid the claims of Columbus before the meeting, and by those of ex-President Mendenhall, who also spoke in favor of Columbus. The fact that a meeting has never been held before in that city was brought out, and the function of the

Association embodied in its name and which concerns itself with the *advance* of science in different parts of the country seemed to be the deciding argument. From present prospects those who feared that to meet at Columbus would mean a small and unenthusiastic attendance are likely to be agreeably surprised. The preliminary programs of Sections A, B, F, G and I, all that have been published in advance, show sufficiently long lists of important papers; the announcements from the Local Committee show great interest and good organization, and we are informed by the Permanent Secretary that the nominations of new members are rapidly coming in and that the advance payments of dues are much more numerous than in previous years. An organized effort has been made by the Local Committee, comprising all the teachers in scientific branches in the State University and other prominent persons in Ohio, to interest and attract especially the scientific workers of the Central States. This is a region filled with universities, colleges and other institutions of learning, yet in the past it has not been properly represented in the Association. In point of membership Massachusetts takes the lead, followed by New York, District of Columbia and Pennsylvania, Ohio ranking as fifth with only 99 members as against nearly 400 resident in the State of Massachusetts. That a national association of the broad scope and aims of the A. A. A. S., should draw one-fifth of its membership from the State of Massachusetts seems paradoxical at this time, although 25 years ago it was quite to be expected. It is greatly hoped that the present movement to interest the Central States to a much more marked degree will be successful and will have a permanent effect.

In a similar editorial published a year ago we sketched briefly the career of the Association, showing that beyond doubt it has been of incalculable value to American science, and considering briefly some of the causes of the change in its relation to the science of the United States during the past 15 or 20 years. The greatest of these causes has been, without doubt, the organization of so many special societies which have diminished the interest in the old Association. Times and conditions have a habit (and it is generally a good habit) of changing. The American Association of 30 years ago did its work and did it well, but it must accommodate itself more and more to changing conditions. It has attempted to do this, as we showed last year, by an increase in the number of its Sections, and very lately by its effort to attract to it as affiliated societies the larger and stronger of the new organizations of special character. Does not the experience of the past few years bring us to the logical conclusion that the Association is bound in future to become more and more a central organization around which will rally annually the best of the special societies? That absolute harmony may exist under these conditions is shown conclusively by the experience of the American Chemical Society and the Geological Society of America, both of which have the custom (prescribed in the by-laws of one of the societies and becoming a permanent fixture with the other) of holding a summer meeting with the Association. Nothing could be more harmoni-

ous or more mutually helpful than the joint meetings which have been held for the past three years of Section C of the Association and the American Chemical Society. Far from being a loser by the founding of this society, the Association has profited by it in no small degree. Is not this an indication of what may be done and, in fact, of what will be done with other sections and other societies not limited geographically?

Reference has been made to the fact that membership in the National Academy of Sciences has destroyed to a great degree the interest which certain of the most prominent men of science in the country once felt in the American Association. That this was and is still true cannot be doubted, but we trust we are not mistaken in saying that we think that we can see signs of a change. Especially since the meeting of the British Association for the Advancement of Science at Toronto, so much has been said in American scientific circles of the importance of the attendance of prominent men of science at the meetings of the British Association as a factor in its great success that prominent Americans cannot fail to have appreciated the point, and surely the large attendance of prominent men at last year's meeting is an indication of a revival of interest on the part of this class, even when we consider that the Boston meeting was an anniversary of great importance.

Apropos of the British Association we are reminded of the editorial published in the *American Naturalist* for January, 1899, under the title 'The American *vs.* the British Association for the Advancement of Science: A Comparison.' In this editorial were compared the membership, the invested funds, the average attendance, the expenses and the sums devoted to research grants of the two Associations, naturally much to the advantage of the British Association. The main explanation pointed out was the geographical one—the wide extent of our own country as compared with that of Great Britain. The remedies suggested were either to break up the American Association into Atlantic, Mississippi and Pacific branches or else to make the meeting so interesting and valuable that members will attend them in spite of individual expense. Rightly enough, the last remedy was the one chosen as preferable, and the first step to bring this about was considered to be the determination of the best scientific men of the country to attend the meetings at a sacrifice of time and money. With this also we agree as well as with, in the main, the other suggestions of the editor of the *Naturalist*. We are of the opinion, however, that in his comparison of the two Associations the writer of the editorial too greatly favored the British Association.

In point of relative attendance at the meetings it must be noted that the proportion of members who attend the meetings of the American Association is quite as great as a rule as is the case with the British Association. The very large numbers recorded at the meetings of the latter Association are due in the main to the large numbers of associates and ladies who pay fees and in this way become the principal financial support of the Association. Thus in the year of largest attendance of the British Association, at the Manchester meeting in 1887, when 3,838 persons regis-

tered and paid fees, 1,985 were associates, 493 were ladies and 92 were foreigners, making a total of 2,570, and leaving but 1,268 actual members of all sections. Assuming the total membership to have been 5,000 the attendance at the largest meeting was only about 25 per cent. of the membership, which brings it to about the average attendance at the meetings of the American Association.

This, however, does not bear seriously upon the main question, except as showing that the American Association by comparison is not in such bad condition as might be supposed. Moreover, it might be indicated that there is a very large fluctuation in the attendance at the meetings of the British Association, as, for example, take the four years prior to 1898: At Oxford, in 1894, 2,321; at Ipswich, in 1895, 1,324; at Liverpool, in 1896, 3,181; at Toronto, in 1897, 1,362. Glancing over the table of attendance, in fact, it seems plain that there is a fairly constant attendance of actual members; that the fluctuations are due to the associate class, and that the large numbers and the large sums of money are gained by meeting in large centers of population. The financial support of the British Association, therefore, depends not only upon its prestige, but upon the work of the Local Committees in charge of the individual meetings and upon the custom of inviting contributions by way of associate memberships.

As to the minor and detailed suggestions in the *Naturalist's* editorial, the reports of the Permanent Secretary submitted to the Council meetings of the American Association in December, 1898, and April, 1899, indicated that all the points mentioned are receiving proper consideration and that reforms have been inaugurated which will result in a very considerable saving of the annual expenses of the Association. For example, a new printing contract has been made whereby the cost of printing will be reduced about one-third, and the items of office hire and janitor's salary have been done away with.

Two points connected with the meetings which have been frequently criticised, and which have been instrumental in preventing the attendance of a considerable number of men who ought to attend, are (1) the interruption of the scientific work of the Sections by excursions and social features, and (2) the time of the year when the Association meets. A well known member of the Association says in a recent letter: "For those who are really in earnest about the work of the Association I believe another great defect is the prominence given to junketing. To busy men, and men especially anxious to present the results of a long investigation, it seems trivial to break up a session of the Association to go off on a clam bake or something." This criticism is a well founded one and is appreciated by the Council, and, in fact, at the spring meeting a resolution was adopted requesting the Local Committee at the Columbus meeting to arrange that no excursions or social features should be planned to begin before 4 o'clock in the afternoon, the all-day excursion being relegated to Saturday at the end of the meeting, thus leaving five solid working days for the sessions of the sections. The other criticism, concerning the time of year when the meeting is held,

is one which has frequently been discussed both in the Council and before the Association. It is true, the weather is apt to be warm the third week in August, and it is true that many Eastern college men dislike or are unable to interrupt their vacations abroad or at the seashore or mountains when their fall terms do not open until late in September or the 1st of October. It is true, also, that many members, both college men and those connected with the government surveys and investigating bureaus, are unable to interrupt their long field trips to out-of-the-way portions of the country. On the other hand, however, many of the Western colleges and most of the normal and high schools, from which institutions the Association derives many members, constituting a class in which it ought of right be especially strong, begin the fall term about the 1st of September, and to fix the meeting time at a later date would prevent their attendance. There are also obvious objections to a winter meeting on the part of perhaps a majority of the members of the Association. That college men from a comparatively limited section of the country can hold successful meetings during the winter holidays has been abundantly shown by the experience of the American Society of Naturalists, the Society of Morphologists, and the kindred organizations which meet together each year at that time. The experiment of midwinter meetings of an individual Section of the American Association in connection with the organizations just mentioned has been tried successfully, and there is no strong reason why it should not become a custom. Another alternative which has been suggested is to hold the meeting in late June or early July. The National Educational Association meets at about that time, but draws largely from a rather different class of workers. It might, however, be worth while for the American Association to try the experiment of such a change of date.

Looking over the ground as a whole, it seems to us that the American Association even in its present condition is a good and sound working body of scientific men. Its aims are admirable, and its policy is adjusting itself to rapidly changing conditions. No one denies that it can be improved, but this improvement must naturally be of rather slow growth, and depends on the active interest of the scientific men of the country in its objects, their appreciation of all it could do, and their determination to help in its work.

THE INTERNATIONAL CATALOGUE OF SCIENTIFIC LITERATURE.

REPORT FROM COLUMBIA UNIVERSITY.

PRESIDENT SETH LOW, LL.D., COLUMBIA UNIVERSITY—*Dear Sir:* The committee appointed by you beg to report on the plans for an International Catalogue of Scientific Literature as follows:

We regard the establishment of such a catalogue as one of the most important contributions that can be made to the advancement of science, and greatly appreciate the efforts of the Royal Society to carry it into effect. We think that all institutions and all men of science should do everything in their power to perfect the arrangements for the catalogue and to promote its efficiency.

We submit herewith discussions of the several schedules of classification from professors of this University engaged in teaching and carrying out investigations in the different sciences. We do not as a commit-

tee endorse all the recommendations made, but call attention to the following points, partly contained in these criticisms of the separate schedules and partly concerned with the catalogue as a whole.

The Royal Society appears to us to have made a serious mistake in failing to consider bibliographies already in existence. Its first duty should have been an examination and comparison of these bibliographies. Those men of science who have given years of thought and labor to the subject should have been invited to consider the merging of the bibliographies under their control into the larger scheme and should have been made chiefly responsible for the classifications of the sciences and for the other plans. We are not even told who are responsible for the schemes of classification. These are of unequal value, closely related sciences being in some cases treated very differently. The Royal Society has now asked the advice of various institutions, but the time until the first of January next seems to us altogether too short to make the necessary arrangements. We recommend that the beginning of the twentieth century be chosen for the commencement of the catalogue.

The centralization, elaborate machinery and governmental support proposed by the Royal Society do not always lead to greater efficiency than individual initiative. The possibility of improving and coordinating existing bibliographies instead of crushing them has apparently not been considered. We recommend that the Royal Society draw up and publish at as early a date as possible full details of existing bibliographies of the sciences.

We regard the card catalogue as more important than the book catalogue, and more in need of a central bureau for distribution. The Royal Society's Committee have, however, not considered the card catalogues already in existence or the possibility of securing entries for card catalogues from the compilers of existing bibliographies. They recommend a card 5 x 3 in., forgetting that even in Great Britain the metric system is used for scientific work, and apparently not knowing that standard cards in the metric system are in use throughout the world. We have in this University hundreds of thousands of such cards in use. It would be desirable to supply cards in both of the standard sizes—5 x 12.5 cm. and 7.5 x 12.5 cm. In the specimen cards given by the Committee of the Royal Society no effort is made to print the entries at the top of the card, which seems to indicate that the Committee are not familiar with the method of filing the cards. The cards should be punctured for a bar to keep them in place. Uniform methods of citation are not followed in the different sciences. The method used in botany appears to us the best for all the sciences, except that the year of publication should probably be transferred to the end. We recommend that the Royal Society report on methods of citation employed in existing bibliographies and make recommendations for the adoption of a uniform system.

In regard to classifications, it is evident that bibliographical convenience rather than the logic of the sciences is the matter to be considered. From either point of view there appears to be as much reason to make mechanics, anatomy and pathology separate sciences as meteorology and crystallography. The exclusion of applied science may be necessary, but it is unfortunate, and will probably lead to the continuation or establishment of bibliographies in chemistry, electricity, geology, pathology, etc., more useful to students than a catalogue confined to pure science. The sub-classifications in new decimal systems for each science may be desirable, but it is not certain that a minute classification by symbols is better than an alphabetical classifi-

cation, or that the new systems proposed are better than the Dewey system, already used in the bibliographies of several sciences. In physiology, for example, there are some 800 classes into which it is expected that 3,500 entries per annum will be sorted. Cards would need to be duplicated many times to be placed in all the sub-divisions to which an article may refer. The schedules of classifications are open to many criticisms. We recommend that the classification of each science be referred to committees who shall especially consider the classifications in existing bibliographies.

J. MCKEEN CATTELL,
H. F. OSBORN,
R. S. WOODWARD.

REPORTS ON THE SEPARATE SCHEDULES.

A. MATHEMATICS.

1. 'A' DESIGNATES in one place Mathematics, in another 'Pure Mathematics.' No provision is made for Mechanics.

2. Under Bibliography a list and description of the various mathematical journals, especially of the bibliographical journals might well be included.

3. Under Arithmetic a sub-division might well be devoted to continuity, countability, etc. (Jordan, Canton, Stoltz).

4. Under Algebra and Theory of Equation, 1250, Klein's theory of the reduction of the solution of equation to the theory of linear groups seems to have been overlooked. In fact, this number (1250) represents far too much, and ought to be divided.

5. Under Groups a sub-division might be given to congruence groups. No. 2010 includes too much.

6. Under Calculus belong mean value and probability. The latter is unprovided for anywhere.

7. 5210, the title is ambiguous.

8. Under Analytical Plane Geometry there should be a sub-division on co-ordinate system, projection, metrical geometry, etc.

F. N. COLE.

B. ASTRONOMY.

(No schedule submitted.)

B. PHYSICS.

THE very greatest care should be used in the details of the classification.

Everything of interest should appear once, and only once, and then in its natural association.

Upon this point rests the working value of the lists. A class should be sub-divided in proportion to its natural sub-divisions and not to the amount of literature covered.

Primary Divisions.

Bibliography should have a section unconfused by others.

Dynamics should not be separated from the theories of matter and ether. Confusion is sure to arise when 'heat' is separated from 'thermal effects' and from 'invisible radiations.'

I. Bibliography.

II. Dynamics of solids, liquids and gases, including vibrations and wave motion.

III. Heat. Including temperature, specific and latent heat.

IV. Radiant energy. Including radiant heat, light and ultraviolet.

V. Electrochemistry and electrolysis.

VI. Electricity and magnetism. The title electromagnetism is misleading; it applies now to a small section of the subject.

It may be argued that any classification will be artificial and each person must learn the classification of his section. But the value of the lists in libraries will lie almost entirely in the opportunity they offer an investigator to look over the literature in *related* divisions.

For example, the physicist cannot be expected to keep posted in the classifications of mathematics, mechanics, chemistry, crystallography, psychology, and possibly

geology and others, and yet it will frequently be necessary for him to consult the cards in these subjects:

Wherein do 0330 and 0335 differ from 3205 and 3210?

Why a special section for 0345 after all the other discussions of elasticity? Compare 0360 and 1520. 0365, too comprehensive, should be sub-divided.

Why the sub-head Hardness, Friction and Viscosity?

Compare 0420 and 0550–0555–0560.

Why no conductivity of gases after 1430?

Is not 1450 superfluous; also 1580?

In 1710 and 1720 the use of 'thermal' seems ambiguous and ill advised.

Compare 1720 and 5140.

2040, superfluous.

2120 and 2210 are conflicting, and why should colloids be put in 2120?

2330 should be considerably sub-divided.

Is 3020 necessary?

3120, compare 3320.

3160 is sure to conflict with the sub-head 'interference and diffraction.'

3210 and 3215 should at least refer to 0330 and 0335.

3220 and 3225 parallel 3255.

3240 at least partly covers 3260.

3320 and 3120 interfere.

3320 quality and 3330 should go to 'sound' instead of 'sensation' and the 'voice' including 'articulation' and 'phonetics' should have a special head.

It would seem possible to improve 4000 to 4040.

5090 and 5240 conflict.

5130 and 5230 conflict.

5020 and 'reflexion and refraction' will lead to confusion.

Why is anomalous dispersion in 5350?

5460, pressure and Zeeman effect should be included.

5550, where are any reference to color, color theories and the optics of the eye? At least a reference must appear here.

6010, too brief, should have several sub-heads. As 'Ampère,' 'Ohm,' 'Farad,' 'induction,' magnetic quantities, etc.

6130 and 6140 should be under 6010. 6110 and 6240 are too comprehensive.

6305, primary and secondary should be separated.

6315 belongs under 6010.

6330, ambiguous.

6350 and 6355, much too comprehensive, each should be sub-divided in three.

6560, same comment.

6570, where are electrostatic waves?

6580, what is electro-optics? Have these phenomena not been given elsewhere?

6770, why theory of compass after all the theories in magnetics and why with the earth especially?

In specimen slips. It seems necessary to cross reference this paper to alternating fields, as it might be of interest to one investigating magnetic fields, 6560 or 6570.

William Hallock.

D. PHYSICS-MECHANICS.

In compliance with your request I beg to submit herewith the following comments on the Report of the Royal Society of London concerning the project for an International Catalogue:

1. The plan for the proposed work outlined by the report, so far as I can understand it from a necessarily hasty examination, seems to be satisfactory and feasible in all essential respects. It appears to merit, however, some criticisms as to matters of detail, which I proceed to point out with some diffidence, since the reasons which led the Royal Society's Committee to adopt the present form of their report must be partly unknown to me.

2. My first criticism relates to the 'schedules of classification,' which seem to be in some respects retrogressive.

a. Would it not be better to have the 'Registration letter' in each case the initial letter of the science?

b. The prominence given to meteorology and the incorporation of mechanics with physics seem quite unwarranted as well as archaic. The definite parts of meteorology and physics are mechanics, and the present tendency is towards mechanical interpretations of the indefinite parts. It would seem to me better to give mechanics a division by itself, or to call the proposed division Physics and Mechanics, or Natural Philosophy.

Similar, though less strong, objections may be urged against the inclusion of

anatomy with zoology, and of pharmacology and pathology with physiology.

3. The schedule of classification for pure mathematics appears quite satisfactory. Defects, if any exist, are rather trivial and relate to details of nomenclature. I would suggest, however, under 0870, p. 2, the inclusion of 'theory of errors' before 'combination of observations.'

4. The schedule of classification for meteorology seems disproportionately extended.

5. The classification for physics, if it should ultimately include mechanics, ought to be rearranged in many important respects.

a. More importance should be given to pure kinematics and kinematical principles.

b. Following Thomson and Tait, dynamics should be divided into statics and kinetics; so that, for example, an entry with reference to flexible strings would indicate whether the case considered is static or kinetic, or both.

c. The entry under 0110, p. 2, for example, should be theory of force, momentum, impulse, energy and work. And under 0120, the statement should be: Principles of statics and kinetics, Differential equations of kinetics. Or, if more detail is desired, it should be: Principle of d'Alembert, virtual work, Lagrange's method, least action, Differential equations of kinetics.

d. Under 0250 there should be included the important sub-division of kinetics of plastic or non-rigid bodies.

e. Under 0515 hydrodynamical should be replaced by hydrokinetic and 0520 should read: Rotational, or vortex motion. Vortex atoms.

6. Many other criticisms concerning matters of detail with reference to the divisions of physics might be submitted. So many changes in the proposed schedule seem desirable, however, that it may be wise to submit the matter to a sub-committee of experts.

R. S. WOODWARD.

E. CRYSTALLOGRAPHY; G. MINERALOGY.

I SUBMIT the following suggestions as to the proposed schedules in Crystallography and Mineralogy:

1. The division 2000, 'Applied Crystallography,' I do not think a good one. It does not suggest to me the sub-divisions, and I suggest 'Crystal Structure and Growth,' to include 1400, 2200, 2300 and 2400 and that 2100 pass under Geometrical.

2. Under Optical Crystallography (4000) the sub-division 4200 is overworked, and the sample references on the next page show it is made to cover discussions of methods of optical measurement, like that of Wallerant. I favor, including under 4000, all optical measurements and replacing 4200, or rather supplementing it, by a division into say: Refraction in Isotropic Crystals, Double Refraction in Uniaxial Crystals, Double Refraction in Biaxial Crystals.

3. In Mineralogy I see no reason why the term General Mineralogy should cover so much. Separate divisions might well be made of (a) Microscopic Study of Minerals in Rocks, (b) Genesis and Alteration of Minerals, (c) Economic Mineralogy, (d) Artificial Minerals (or Synthesis).

I favor the plan of printing both standard sizes of card. It cannot greatly increase the expense, and will enable subscribers to choose the size already used by them. We have about 20,000 references on the smaller card.

ALFRED J. MOSES.

F. CHEMISTRY.

I HAVE read very carefully the proposed schedule of classification for chemistry of the International Catalogue Committee, and

it seems to me to pretty thoroughly cover the ground, and I do not see anything to find fault with. The only thing that occurs to me is the absence of titles covering chemical industries, but I presume they have been provided for in some other schedule. I refer, for example, to the following topics among others:

Sewer-gas	petroleum
mineral waters	illuminating gas
potable waters	mortars
water analysis	cements
sewage purification	pigments
water purification	paints
artificial illumination	varnishes
candles	preservation of timber
oils	the different explosives
lamps	glass
bleaching	ceramics
dyeing	foods, all varieties
calico-printing	preservation of food
paper-making	wines, beer, spirits
glue	vinegar
india rubber	gutta percha
fertilizers	etc., etc.

It may be that all this is provided for in some other part of your schedule.

C. F. Chandler.

H. GEOLOGY; J. GEOGRAPHY.

I have looked over the subjects of Geology, Geography and Paleontology, as requested, in the proposed International Catalogue of the Royal Society. I feel only competent to speak of Geology authoritatively, and in this I have endeavored to imagine myself in search of literature upon almost any imaginable geological subject. The scheme impresses me in general with being a satisfactory guide in this respect, with one important omission. In almost all the important mining countries, our own especially, a great deal of attention is given to the study of what we call economic geology, or, as it is more often called abroad, applied or practical geology. I find no special topic that would cover this at all. Suppose I wished to find papers on Ore Deposits in general, or on Coal, or Building Stones, there is no topic under which these subjects would come, unless perchance it is G. Mineralogy, General Mineralogy, 0600, Applications, which seems to me an improper place for them, because they are chiefly issued by Geological Surveys or in connection with them and are geologically treated. It seems to me that in addition to the heads under H. Geology, viz: General, Petrology, Physical, Statigraphical, Maps, there should be Economics—with sub-heads—Ore Deposits in general.

Then the metals in particular—Non-Metallic Substances:

Coal	Petroleum
Building Stones	Abrasives
Salines	Fertilizers
Soils	etc.

I fancy that this sub-division of titles would be more often consulted than any other.

Under Geography and Paleontology the classification seems to me to furnish a guide that will lead one to a desired goal, satisfactorily; but I hesitate to speak positively.

There is one other general point, and that is that the scheme should fall in, if possible, with plans already established, and I do not observe that it considers the Dewey system, now adopted in an extensive bibliography of the same kind in Geology in Belgium, and issued, I believe, by the Belgian Geological Survey.

J. F. Kemp.

K. PALEONTOLOGY; L. ZOOLOGY.

We have looked forward with great interest to the preliminary report of the International Catalogue Committee, which we understand is to be considered as a report of progress subject to future modification. It may seem somewhat unappreciative of the work that has been already done upon this report, but we must express our opinion very frankly that it is disappointing and

unsatisfactory. There are no indications that the Editors of the four Biological Divisions, Paleontology, Zoology, Botany and Physiology, have cooperated to produce a uniform scheme of treatment. On the other hand, although these sciences are in their nature closely connected, they receive an entirely diverse classification. Physiology, moreover, receives a treatment of minute sub-division which not only contrasts with the large sub-divisions of the other branches, but appears to us to be too far detailed.

The most radical fault, in our opinion, is the separation of living and extinct members in many cases of the same families and genera in the great divisions of Paleontology (including plants and animals), Zoology and Botany. This great catalogue should open a new century and signalize modern belief that living and extinct types must be considered together. It may be urged that many faunæ are wholly extinct and are studied exclusively by Paleontologists. On the other hand, no scientific line of demarcation can probably be drawn, and if living and extinct types are not studied together they certainly should be. Among the Vertebrates the separation of the living and extinct forms is at present a calamity. Zoologists must become familiar with Paleontology whether they prefer to do so or not. It is impossible, for example, to understand the modern races of dogs without studying the Oligocene races and their ancestors.

Under Paleontology the Editor proposes to give a complete catalogue of paleontological papers upon their zoological side. This would necessitate a double system of cataloguing for every paleontological paper, a needless waste of money and time.

The second radical fault, hardly less serious than the first, is the fundamentally different classification observed in Paleontology, Botany and Zoology. The Paleontological schedule is wholly unintelligible to us. It is partly Biological, partly Bibliographical. What unity is there in a system of classification which is based upon such diverse lines as are observed in 01 and 02? Where are the lines drawn between 00 and 25?

In our opinion, Paleontological classification should be identical with Zoological; it would be only necessary to add Geological distribution and to deduct cell processes; development could remain because we have considerable embryological data in extinct forms.

The Zoological classification is much better, although subject to considerable criticism in matters of detail. Why should Botanical classification differ so fundamentally from the Zoological? Modern Botany is pursued upon exactly the same lines as modern Zoology; for instance, cell processes, or Cytology, are now pursued as ardently by botanists as by zoologists.

HENRY F. OSBORN.

M. BOTANY.

THE scheme of classification adopted is not, in our judgment, as satisfactory as a decimal system would be. A number applied to a subject here means nothing definite, unless it is accompanied by a letter also, whereas in a decimal system each number would mean only one subject and could not possibly be confused with anything else.

The examples of classification of subjects indicate an attempt at too great detail, as, for instance, in the case cited 'on some new plants from Somali-land,' the attempt is made to give a detailed synopsis of contents of the article, giving names of species described with pages of publication cited, etc. Such details belong more properly to an index to systematic botany rather than to a more general index to periodical literature, which it would seem to us is all that should be attempted. Such a title as the above need

have no more than two cards, one for the author and one to be classified under Africa, with its appropriate geographic subdivision.

The method of citing volume, page and date is not at all uniform in the different divisions of the subject. We would recommend the following, which is the form used in the Index to American Literature relating to Botany, which has been in successful employment for several years and is the form commonly used by American botanists. It is further only a slight modification of the form used by the present committee in some of the sections, *e. g.*, Mineralogy.

The rules in use by American botanists are as follows:

1. All citations commence with the author (last name), followed by initials, followed by a comma, followed by the title abbreviated according to a definite uniform formula so as to be clearly distinctive.

2. Citation of journal is followed by series number (if any) in Roman, followed by a period.

3. Volume number follows in black letter (full-face type), followed by a colon, all other punctuation being periods; this is distinctive.

4. Pages limiting the articles follow, separated by a hyphen, or, if consecutive, by a comma, *e. g.*, 314–345. 32, 33.

5. Plates and figures follow printed in italics and abbreviated as follows: *pl. 37–39.—pl. 5. f. 3.*, all separated by periods.

6. Last of all follows the date, either the year only, or, in matters where priority of publication is involved the exact date if known, the months abbreviated according to the American Library system.

A sample may be seen in the following:

Greene, E. L., The American species of Quercus. Jour. Washington Biol. Soc. II. 13: 223–257. *pl. 9–16.* 3 Ja 1898.

In this way the desired facts of the citation are orderly and easily noted.

The scheme under consideration seems to involve only one size of cards for the topics. As many of the larger American libraries regularly use the narrow standard cards, the slips should be capable of being printed on both standards. In the samples given, much space at the top of the card is wasted in giving the letters and numbers that designate the position of the card in the series. This is a subsidiary matter when the card is once in place and should be so printed that the title which is of prime importance should be placed as near the top of the card as possible, to facilitate ease of reference when standing on edge in its tray.

L. M. Underwood.

N. PHYSIOLOGY.

I have been asked to say a word regarding the scheme of classification of physiological literature proposed by the Royal Society.

The suggested schedule is primarily and essentially a morphological one, the basis being cells, tissues, organs and organisms. In the present state of physiological investigation doubtless this is preferable to a scheme based on function alone, and the proposed scheme is comprehensive and in most respects excellent. But there is one defect that seems to me serious. There is no place for articles upon a considerable number of general physiological principles and phenomena, such as physiological division of labor, irritability, summation of stimuli, rhythm, specific energy, automaticity, fatigue, etc., etc. Many of these apply equally to cells, tissues, organs and organisms. When they are discussed with reference to specific things the articles can be classed under 05 of the respective groups. But when they are discussed simply as general principles and phenomena there is no place for them. It may be intended that they shall be placed under 'Philosophy' (0110), but such a position, under the heading 'Physiology of the Organism as a Whole,' would be only partially correct. This is the most serious omission in the proposed schedule and should not, it seems to me, be allowed to exist. It can readily be obviated by inserting between 'General

Experimental Methods' and 'Physiology of the Organism as a Whole' a new paragraph entitled 'General Physiological Phenomena,' or something similar.

Regarding one of these general phenoma a further word may be said. It has been thought best to give 'Fatigue' a special place, numbered 35, under both 'Muscle' and 'Nerve.' This is probably wise, but if it is recognized here, why not elsewhere, and why is not the same number reserved for it in other groups? Under 'Spinal Cord' 35 signifies 'Relation to Sensations'; and under 'Cerebral Hemispheres' it signifies 'Tracts of Association and Commissures.' Doubtless any scheme of bibliographical classification must be guilty of inconsistencies, but there seems no necessity for this one.

I need not emphasize that I am greatly interested in the proposed catalogue, and I trust that nothing, not even differences of opinion regarding the scheme of classification, will prevent its prompt inauguration.

FREDERIC S. LEE.

P. PSYCHOLOGY.

A SCHEME of classification for psychology has not been submitted with the other schedules. This is unfortunate, as the subject-matter of psychology and its classification require careful consideration. This can scarcely be given in Great Britain, where the science is more backward than in Germany, France and the United States. The *Zeitschrift für Psychologie und Physiologie der Sinnesorgane* and the *Psychological Review* publish annual bibliographies and the *Index* of the *Psychological Review* is republished in the *Année psychologique*. It is to be hoped that the committee of the Royal Society will consult these journals and profit by their experience. The *Psychological Index* for 1898 contains 2,558 titles, has been issued within three months of the close of the year, and is sold for $1.00. The total cost of the *Psychological Index* (500 copies) is about $250. For the book catalogue of the Royal Society's plan the cost per science with 2,500 titles is estimated at $1,700 (which does not include the real work of classification done by the regional bureaus), and the volume is to be sold for $5.00. It is by no means certain that the somewhat cumbrous machinery proposed will furnish a better bibliography of psychology than that of the *Psychological Review*, and it does not appear that psychology will profit greatly by the International Catalogue unless the card catalogue is undertaken. This I regard as far more important than the book catalogue.

While no schedule for psychology has yet been proposed, there is a certain amount of psychology in the other schedules. I do not understand why the obsolete psychological classification of physics has been partially followed. 'Theory of Wave Motion' is given as a sub-heading under 'Vibrations, Waves and Sound'. Heat with a sub-heading 'Radiation' is given earlier, while 'Light' comes later. There is given a heading 'The Sensation of Sound' under Physics, and one on 'Hearing' under Physiology. In both sciences we find, *e. g.*, a sub-heading 'Limits of Audition dependent on Intensity and Pitch.' In neither science is there a corresponding heading for Vision. Sensation and Perception should be confined to the schedule for Psychology.

J. MCKEEN CATTELL.

Q. ANTHROPOLOGY.

THE classification of Anthropology suggested in the 'Report of the Committee of the Royal Society of London' does not seem to be very systematic. It does not quite exhaust the subject-matter of anthropology, and, on the other hand, certain topics are repeated under different headings. In drawing up a schedule of this kind it

might be well to utilize the experience gained by a number of journals which have given full bibliographies of anthropology for a series of years, principally the bibliography of the 'Archiv für Anthropologie,' which has been continued successfully through a considerable series of years, and from which also an approximate estimate of the annual number of entries may be gained.

It would seem that the schedule for anthropology should correspond with the schedule of geography, of zoology, of physiology and of psychology. The numbers J 3700, J 3710, and J 3720 relate to J 3730 and J 3740, ethnography, population and race, language, customs and occupations, migration. These will be duplicated in Q. On the other hand, the topographical classification applied in geography should be applied in the schedule for anthropology.

The division Anthropometry, which is evidently meant to embrace the anthropological treatment of anatomical, physiological and psychological questions, will probably better be arranged according to the schedule suggested for zoology, physiology and psychology. It would seem that the division Races might best be replaced by the geographical division suggested in the schedule for geography.

The term 'Ethnology' is not represented in the schedule, the last seven divisions evidently being intended to take its place. The sub-division of these divisions are of very unequal scope, and the general principle underlying these seven classes is not quite consistent. This is partially true of sociology in its relation to arts, religion and administration. If the sub-divisions were carried out in the manner proposed, the number of secondary slips would become exceedingly large, probably so large as to become unwieldly. For this reason it would seem to the writer that for descriptive material a less number of sub-divisions combined with geographical sub-divisions might be used, while for ethnological discussions the geographical sub-division might be disregarded, and an exhaustive ethnological sub-division might take its place.

Franz Boas.

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*THE DANGER OF INDISCRIMINATE ACCLIMATIZATION IN THE CASE OF MAMMALS AND BIRDS.**

Two events of the past year have drawn attention to the evils which are likely to follow the unrestricted introduction of birds and mammals into new localities. The attempt to expel the English sparrow from Boston Common last spring aroused unusual interest in this bird throughout Massachusetts and made many persons realize, perhaps for the first time, the extent to which it had spread in the United States. The recent acquisition of new territory has brought up the question of dealing with new pests and preventing their introduction into this country. Both Hawaii and Puerto Rico are overrun by the mongoose, one of the most destructive animals in the world, and prompt and effective measures are necessary to prevent its introduction into some of the Southern or Western States.

Acclimatization has deservedly attracted widespread interest, but too little attention has been paid to the safeguards necessary in such experiments. Animals and birds, unlike plants, are seldom kept in captivity, but are liberated in order that they may live as nearly as possible under natural conditions. Even domesticated animals may cause untold damage if allowed to run wild and increase indefinitely, as shown by the work of goats and cats which have been turned loose on islands. Animals,

* Abstract of article entitled 'The Danger of Introducing Noxious Animals and Birds,' Yearbook of the Department of Agriculture for 1898, pp. 87-110. Illustrated.

unlike plants and insects, depend on man almost entirely for their distribution from one continent to another, and, with few exceptions, are intentionally introduced. Cases of accidental distribution are confined almost entirely to rats and mice, which readily find their way to nearly all parts of the world by means of vessels. The question of preventing the introduction of noxious mammals and birds is apparently simple, and doubtless would be comparatively easy to deal with were it not for the general ignorance or indifference regarding the dangers of ill-advised acclimatization.

The mammals and birds which have thus far proved most troublesome when introduced into foreign lands are nearly all natives of the Old World. Beside cats, rats and mice, they include the rabbit, stoat, weasel, house sparrow and starling of Europe, and the mongoose and mina of India. The so-called flying foxes, or fruit-eating bats, are very destructive in New South Wales and Queensland, and are consequently a source of danger, for, although not yet actually introduced, they are likely to be carried to Hawaii and other islands in the Pacific. Some birds usually considered beneficial in their native homes are likely to prove injurious elsewhere, such as the European skylark, green linnet, black thrush, or blackbird, and the great titmouse, or 'Kohlmeise.

It will hardly be necessary to take up each of these species in detail. The history of the rabbit in Australia and New Zealand, its prodigious increase despite lavish expenditures for its destruction, and the enormous export trade in skins and canned rabbits which has recently sprung up, are too well known to require repetition here. The stoats and weasels liberated in New Zealand to kill off the rabbits have also become a pest and threaten to exterminate certain native birds. The mongoose, carried to Jamaica, in 1872, to aid in controlling the rat plague, increased almost as fast as the rabbits in the Antipodes, and, although it effectually reduced the number of rats, the advantage proved to be temporary and dearly bought. The animals increased until they spread over the whole island and became a greater pest than the rats on account of their wholesale destruction of poultry, game, ground-nesting birds of various kinds, reptiles and even fruits. The decrease of birds was followed by a marked increase in certain insect pests, but recent reports indicate that the mongoose is diminishing somewhat in numbers and some of the birds are increasing, so that both native and introduced species are adapting themselves to new conditions. In Hawaii the record is much the same, although the mongoose has not yet become quite such a nuisance as it has in Jamaica. The English sparrow was brought to America less than fifty years ago, but is now present in every State and Territory, with half a dozen exceptions, and is known as a pest to nearly every one in the eastern United States. It has begun to spread in Argentina, while in Australia it is even more troublesome than in this country. It has also gained a foothold in Hawaii and on numerous islands in the Atlantic, Pacific and Indian Oceans.

When it is considered that in nearly every case the species just mentioned were deliberately and intentionally introduced, under the mistaken idea that they were beneficial, it is evident that immense loss may result from the well-meaning efforts of thoughtless or ignorant persons, for an injurious species is likely to spread more surely and steadily than a contagious disease. The danger from such experiments is too real to be dealt with lightly and is now beginning to be realized. Cape Colony prohibits the importation or keeping of rabbits except under strict regulations.

Western Australia has absolutely prohibited the introduction of rabbits, English sparrows, flying foxes, starlings, blackbirds and thrushes, and upon the recommendation of the Colonial Bureau of Agriculture can increase the list of proscribed species at any time. California has likewise prohibited the introduction of Australian rabbits, flying foxes, or other animals or birds detrimental to fruit growing, but while she may be able to prevent the direct importation of these pests she can not keep them out if they once become acclimated in neighboring States, for they would swarm in from the north or the east as readily as the English sparrow spreads from one State to another.

The remedy is simple. Congress should take steps promptly to protect Hawaii and Puerto Rico against further introduction of noxious species and to prevent the mongoose from being brought into the United States. The introduction of exotic mammals and birds should be restricted by law and should be under the control of the U. S. Department of Agriculture. The wild rabbit, the mongoose, the flying foxes and the mina of the Old World should be rigidly excluded, and species of doubtful value, such as the starling, skylark, kohlmeise and blackbird, should be imported with the greatest care, and only in places where they can be controlled in case they prove injurious.

T. S. Palmer.

Washington, D. C.

THE MENTAL EFFECTS OF THE WEATHER.

The influence of the weather upon mental states has been a matter of comment since the days of the ancients, though but little scientific work has been done to determine, either qualitatively or quantitatively, just what the effect is. The weather maxims of wiseacres have been based very largely upon the peculiar activities of various members of the animal kingdom under definite meteorological conditions—usually those immediately preceding a storm—but, aside from these literary curiosities, material bearing even indirectly upon the subject is extremely limited. The effect of climate upon racial traits has been much more fully treated, both by the anthropologist and the criminologist, and the literature of the subject is quite extended. We are most of us, however, convinced that, whatever racial differences may be ascribed to the varying climates of different parts of our planet, we as individuals are influenced in our conduct to a marked degree by varying meteorological conditions. Literature is full of allusions to such influences, and not a few of the world's great thinkers have left on record observations of such effects upon themselves.

The study which forms the basis of this paper is an attempt to throw some light upon the problem by comparing the occurrences of certain misdemeanors and other data of conduct, under definite weather conditions, with the prevalence of those conditions. The method of its prosecution was as follows: At the New York City station of the United States Weather Bureau the mean barometer, temperature and humidity, the total movement of the wind, the character of the day and the precipitation for each one of the 3,650 days of the years 1888–1897 inclusive were copied upon specially prepared blanks. From these records were then computed, by a process of tabulation, the exact percentage of days which were characterized as fair, partly cloudy, as rainy or clear, or as having come within a definite temperature group of 5° to 10°, 10° to 15°, 15° to 20°—and, in a similar manner, within arbitrarily determined groups for barometer, humidity and wind. In this way the normal prevalence of any definite meteorological condition was determined as a basis for comparison with the occurrence of the data studied.

The latter were taken from various records available in New York City and consisted for the most part of misdemeanors under the observation of the police force of the city, the teachers in the public schools and the warden of the penitentiary, although the death record kept by the Board of Health was also considered. The total number of data considered exceeded 400,000, made up of cases of assault and battery, suicide, and arrests for insanity by the police, recorded misdemeanor in the penitentiary and public schools, record of deaths for the city, record of errors made by clerks in several of the larger national banks and record of strength tests made in the gymnasium of Columbia University. The classes of data varied in number from 1,000 to more than 100,000, and were for the years included within the period for which the weather conditions had been tabulated. By a somewhat elaborate process of computation the exact percentage of each class of data occurring under each of the definite meteorological groups was determined; for example, the percentage on fair or cloudy days, on days when the temperature was between 15° and 20°, etc., for all the fifty or more conditions studied.

We have already stated that from the meteorological data, the normal prevalence of these conditions had been determined. It may be readily seen, however, that the normal prevalence of a condition equals the expected occurrences of each of the classes of data for that condition—for instance, if 30 % of the days for the ten years were fair we should expect 30 % of the assaults, suicides, etc., to have occurred upon fair days *if the character of the day had no influence.* If, however, 35 % did actually occur we should infer that the effect of fair days was to increase the number of assaults, as, indeed, this study has shown to be the case.

The conclusions of the paper are based entirely upon this comparison of occurrence of data under a given meteorological condition, with the prevalence of that condition. Both were reduced to percentages. When the occurrence for a given condition was found to exceed the expectancy the exact *excess* was computed and when below the deficiency. More than one hundred and fifty curves were constructed showing these relations (see 'Conduct and the Weather,' Monograph Supplement No. 10 to *The Psychological Review*), a few of which are shown with this paper.

Moderately high temperatures were found to be accompanied by excess in all the misdemeanors considered; low temperatures by deficiencies. The temperature group 80–85° showing an excess of 68 % for assaults by males and 100 % for those by females. The next higher group, however, shows a drop to 33 % excess for the former and a deficiency of 33 % for the latter. This sudden falling-off for conditions of intense heat is shown for nearly all classes of data, and is undoubtedly due to the fact that under such temperature there is little energy available for offensive conduct. Death, suicide and the recorded error in banks alone remain excessive under such conditions.

Figs. 1 and 2 give a comparison of the occurrence of assault and death (male) referred to the temperature conditions for each month of the year. It may be seen from them that during the winter months the temperature produces but little effect, there being but slight excesses or deficiencies for any of the groups. Excesses and deficiencies read vertically. The horizontal lines show differences of 20 %, read from the heavier base lines.

When, however, we come to the spring, the higher temperature for the months are accompanied by a very marked increase in the number of assaults (April, 70–75°, an excess of 64 %) and one less marked for death. During the heated summer time

the highest temperatures do not show the greatest excesses for assaults, but the increase in the death rate is parallel with that of heat. During the unusually hot days in September and October we have about the same relation between the curves that was shown for the spring months—

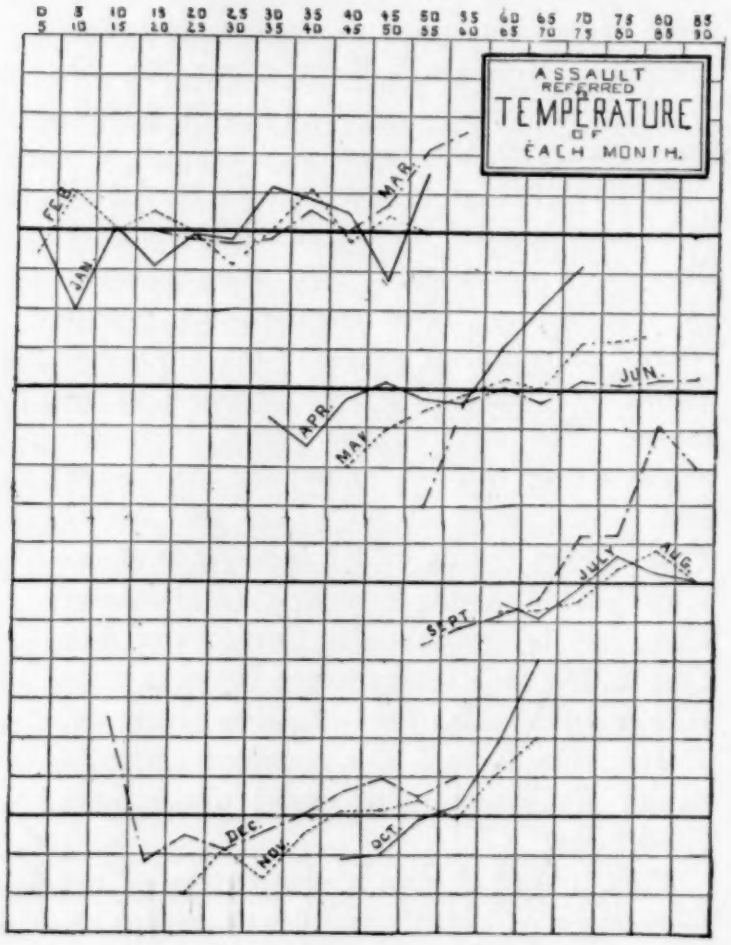

Fig. 1.

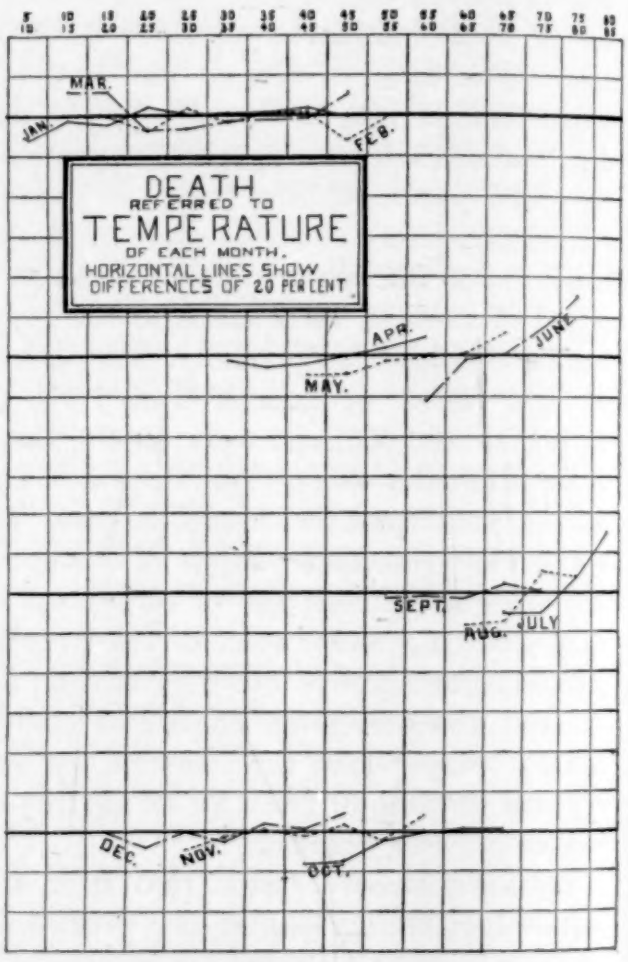

Fig. 2.

i. e., a great excess in assaults and only a moderate one in deaths. These relations are fairly conclusive, as they are based upon 36,000 assaults and 100,000 deaths.

Generalizations based upon the study of the barometrical conditions show that nearly all the data studied were excessive during low readings of the instrument. There are many reasons for concluding, however, that the actual density of the atmosphere is not the influencing factor here, but the barometrical conditions as accompaniments of other meteorological states which are themselves the effective ones—for instance, storms.

The study of humidity, in its effect upon the data of conduct gave some interesting results, since it demonstrated, beyond a doubt, that conditions of low humidity are those most productive of misdemeanor. When we consider that the muggy, sticky days on which we feel it our natural prerogative to be 'out of sorts' are of the opposite character this is quite surprising. The deficiency of disorders on such days is, however, undoubtedly due to the fact that although they are emotionally depressing they are also physically weakening, and however 'ugly' a man might feel, if energy were lacking, to be offensively active the police court is none the wiser, and the fact is lost to our study. A tabulation of profanity or even a record of the ducking stool

of colonial days might give different results. In Denver, Colorado (see also 'Conduct and the Weather'), where the humidity is normally very low, the number of misdemeanors reached an excess of more than 600% for readings between 15 and 25, which is a condition never experienced at the lower altitudes.

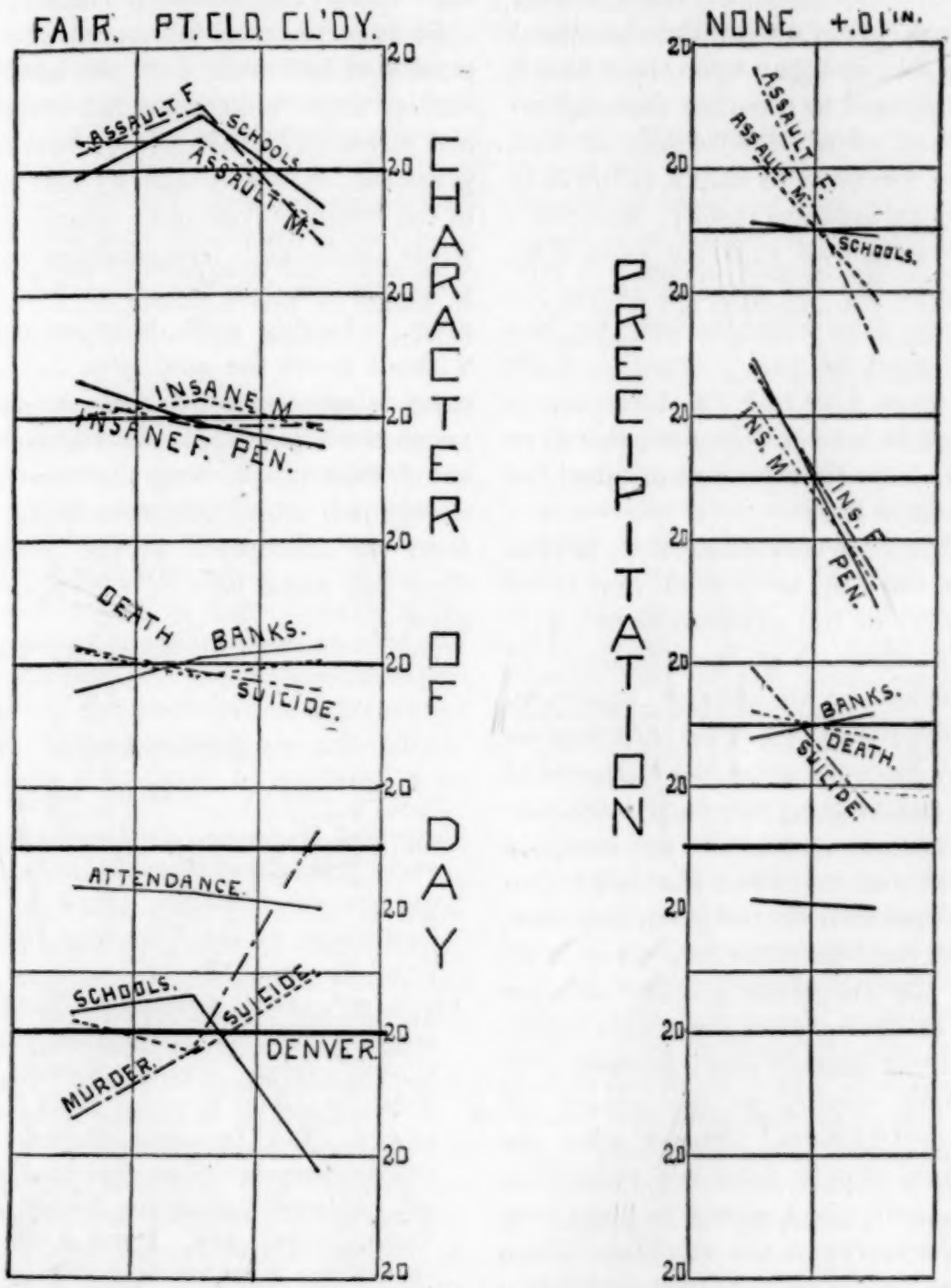

FIG. 3.

The study of the seeming effects of the winds discloses the fact that misdemeanors of the classes studied show marked deficiencies during calm (—50%) with the greatest excesses during moderately high winds and moderate deficiences again for great wind velocities. Death and suicide alone are excessive on calm days.

The state of conduct on days of different character—that is, fair, partly cloudy,

cloudy, rainy and clear—presents, I believe, a genuine surprise (see Fig. 3). This figure is to be interpreted in the same manner as the others. From it we see that misdemeanors are less frequent upon cloudy and rainy days (latter under 'Precipitation' marked '+.01' in.) than upon those which we are accustomed to consider more agreeable. In fact, of all the classes of data studied, that for error in banks is the only one showing an opposite result. Reference to the curves shows that for assault by males (Assault M) the greatest excess occurred upon days characterized by the Weather Bureau as partly cloudy. Such days have from 4/10 to 7/10 of the hours from sunrise to sunset obscured, fair days having more than that amount of sunshine and cloudy days less.

Perhaps the most surprising curve is that for suicides, showing as it does that those who are weary of life choose the fair day, upon which there is no precipitation as the time for ending an unhappy existence. This, together with the fact that the months of May and June show the fullest record of suicides of any of the year, is directly contradictory to what seems to be the accepted opinion upon such matters. Perhaps fiction is largely responsible for the prevailing idea, and fiction would certainly lose much of its thunder if the proverbial gloomy weather could not be brought in for tragic effect. The prevailing climate may, however, influence these results, as the study for Denver (see 'Suicides' Denver upon the figure), where cloudy days are something of a rarity, their effect seems to have been more disastrous upon the suicide. There an excess of 32% is indicated for such days. The social conditions there, are, however, somewhat peculiar, as the population contains a large number of people who have gone to the region in search of health, which the sunshine was depended upon to restore, and the discouragement of even a brief deprivation of its presence was too great to be borne. Even the death rate is shown by the curves to be slightly higher during bright weather, although the difference for days of varying character is not great.

Perhaps the most interesting general conclusion to be drawn from the study is that during those meteorological states which are physically exhilarating, excesses in deportment, in the ordinarily accepted sense of the word, prevail to an abnormal extent, while death and irregularities in mental processes (error in banks) are below expectancy. During such weather conditions, without doubt the quality of the emotional state is more positive than under the reverse conditions, but the results seem to show that in the long run an excess of energy is a more dangerous thing, at least from the standpoint of the police court, than the worst sort of a temper with no energy.

Edwin G. Dexter.

SCIENTIFIC BOOKS.

SOME RECENT WORKS ON MECHANICS.

Theoretical Mechanics, An Introductory Treatise on the Principles of Dynamics, with Applications and Numerous Examples. By A. E. H. Love. Cambridge, At the University Press. 1897. 8vo. Pp. xv + 379.

Vorlesungen über theoretische Physik von H. von Helmholtz. Herausgegeben Von Arthur König, Otto Krigar-Menzel, Franz Richarz, Carl Runge. Band I., Abtheilung 2. Die Dynamik discreter Massenpunkte, herausgegeben von Otto Krigar Menzel. Leipzig, Verlag von Johann Ambrosius Barth. 1898. 8vo. Pp. x + 380.

One of the most original and suggestive of recent works on theoretical mechanics is the treatise on dynamics of Professor Love. The merits of this important book arise naturally from the author's point of view, and we are prepared to expect something more than stereotyped forms on reading in his preface that "The works which have been most useful to me in

connection with matters of principle are Kirchhoff's Vorlesungen über mathematische Physik (Mechanik), Pearson's Grammar of Science, and Mach's Science of Mechanics. This last should be in the hands of all students who desire to follow the history of dynamical ideas." We are still more interested to examine the book when we read in the introductory paragraph that "Mechanics is a natural science; its data are facts of experience; its principles are generalizations from experience. The possibility of natural science depends on a principle which is itself derived from multitudes of particular experiences—the 'Principle of the Uniformity of Nature.' This principle may be stated as follows: Natural events take place in invariable sequences."

From this classification of mechanics along with the natural sciences one may correctly infer that the work is more concerned with the facts than with the formulas of the subject. Indeed, the old notion, still held by many, that mechanics is simply a branch of applied mathematics whose data are as unquestionable as the data of Euclidean geometry, finds no tolerance here. On the contrary, one of the most important features of the work consists in its critical examination of the postulates and principles of mechanics and their range of applicability to matter as we know it. The doctrine of relativity of motion, force, etc., so generally overlooked or ignored in works on dynamics, is here considered with much particularity; well-known results are presented in clearer lights, and many new or less well-known results are to be found in every chapter. In short, the work is a thoroughly progressive and instructive treatise which will bring pleasure and profit to any energetic student of mechanics.

The book is divided into three parts embracing in all thirteen chapters. The first part, including the first four chapters, deals with kinematics; the first chapter being devoted to definitions, the second to vectors, the third to displacement, velocity and acceleration, and the fourth to applications of kinematical principles. A novelty of nomenclature introduced here with apparent advantage is the word 'frame,' or the phrase 'frame of reference,' in place of 'axes' or 'coordinate axes,' though one may doubt the desirability of such a change of terms unless it can be made in other applications of coordinate geometry as well.

The second part, Chapters V. to VIII., is devoted to the principles of dynamics. Herein there is a notable departure from the plan of treatment followed in most English texts. There is less of the appearance of formal deduction and more of the reality of simple induction. This method leads, by an appeal to observation and experiment, to the essential concepts of mass and force, and thence to the equations of motion of a free particle. The laws of motion of Newton are not incorporated in the text, but are commented upon in a note at the end of Chapter V. General theorems concerning the motions of masses are considered in Chapter VI.; systems of forces are treated in Chapter VII., and Chapter VIII. is devoted to work and energy. A new and commendable term, namely, 'kinetic reaction,' appears in this part for the first time, apparently, in a text-book. This may well replace the 'expressed force,' 'force of inertia,' etc., of earlier writers. A critical note at the end of Chapter VIII. is well worth examination by advanced students of the science.

The third part of the work, Chapters IX. to XIII., deals with methods and applications. These cover about 120 pages, and a large variety of solved and unsolved problems is set before the reader. Chapter IX. is occupied with free motions of particles, X. with constrained motion, XI. with coplanar motions of a rigid body, XII. with miscellaneous methods, and XIII. with relative motion and gravitation. Much space is given in these chapters to impulsive motions and to the intricate questions of initial motions, and a considerable portion of Chapter XII. is devoted to the interesting subject of the motions of strings and chains. A short appendix deals with the questions of units and their dimensions.

The work appears to be subject to the following minor criticisms: Too little space is given to kinetics in three dimensions. On p. 96 there is a definition of the law of gravitation which will lead the incautious reader to adopt the common but erroneous notion that the gravitation constant is a mere number, that is, a quan-

tity independent of the units of length, mass and time. And this leads to the remark that in didactic treatises it is best for the author as well as the student to make constant use of the theory of dimensions. On pp. 258, 260, 262, we find the phrase 'impulsive pressure' used as a synonym for momentum and impulse. This is plainly a slip of the pen, since the equally objectionable 'impulsive force' of the older writers finds no favor with the author. Here again, and also in the phrase 'angular momentum,' which the author seems to sanction as the equivalent of 'moment of momentum,' the theory of dimensions points the way to precision of terminology. Lastly, a book so full of excellencies should have a much fuller index, some comparatively new terms like dissipative forces, motional forces and positional forces being omitted or given only indirectly, and the important name of Mach being overlooked altogether.

With commendable admiration for their great master, the editors of the series of volumes to which the one before us belongs have undertaken to present in printed form the lectures on mathematical physics delivered by Helmholtz in the later years of his life. In doing this they are doubtless fulfilling a pious duty, but they are also assuming a serious task, for no one short of a master is fitted to elaborate the lectures of a master. As regards the present volume, on the dynamics of discrete particles, the task of the editor was not specially difficult, since the subject has been pretty thoroughly wrought out during the past two hundred years. In fact, much of the matter in this volume would not be worth publishing at all in such a series if it did not possess here and there the impress of the master's originality.

The book is divided into four parts. The first part deals with the kinematics of a point, the second with the dynamics of a material point, the third with the dynamics of a material system, and the fourth is devoted to the general principles of dynamics, including statics as visualized in the principle of virtual displacements, and the methods of d'Alembert, Lagrange and Hamilton in kinetics.

The first part presents little that is novel, and is quite insufficient for the needs of anything beyond elementary work in kinematics. The most important theorems of the subject are not even alluded to. The second part establishes the equations of motion of a free particle by the aid of Newton's laws, and devotes an undue amount of space to the simplified case of a 'falling body' without disclosing anything of its essential complexity. Then follow seventy-seven pages treating of oscillatory motions, including simple harmonic and damped vibrations and the theory of the simple pendulum moving in a plane or cone. Much of this space is rather dreary in its prolixity, but the physicist will find the sections treating of damped vibrations and forced vibrations well worth reading.

The third part sets down the equations of motion of a system of masses by aid of the principle of equality of action and reaction whereby the internal forces of the system are seen to be self-balancing. Then follow the well-known theorems concerning the motion of translation of the centroid of the system and of its rotation about axes through the centroid. The notation used here is needlessly complex; but the following section, which deals with the very important subject of moments of inertia, is rendered repulsive by reason of a violent and quite useless departure from current notation. Why should a subject so old (dating from Segner and Euler) and so intrinsically difficult be encumbered by a strange notation when nothing new is presented?

The remainder of the third part is devoted to the principle of energy and to an elementary presentation of the theory of planetary motion. The forty pages allotted to the doctrine of energy are chiefly interesting for their historical matter and for the author's physical conceptions, while the thirty-six pages in which Newton's problem of two bodies is treated afford an easy introduction to dynamical astronomy.

For the advanced student of mechanics the fourth part of the book will be found most interesting and instructive. It is in this part that the editor presents the author's latest views on the generalities of the science. There is not much herein that is new; but the student

who is unacquainted with Helmholtz's modes of thought will find it well worth the effort essential to master the connected exposition here given of the comprehensive methods of d'Alembert, Lagrange and Hamilton. Many readers will encounter a difficulty in an unusual and, apparently, an unhappy notation, considering the precedents set long ago by Lagrange. Those to whom English is the mother tongue will also be pained at the ease with which the old and the new terminologies are mixed. But these are minor matters in comparison with the clear physical concepts and the penetrating analytical processes which characterize the work of the great author. This last part, which comprises a little more than one-fourth of the bulk of the book, is divided into four chapters. The first of these treats of statics from the point of view of virtual displacements and as the vanishing case of kinetics. The second treats of kinetics, giving especial attention to the equations of d'Alembert, Lagrange and Hamilton, the author's well known preference being expressed for the Hamiltonian form of equation. The third chapter deals with the applications furnished by rigid bodies, including the theory of the top and the theory of terrestrial precession in their elements. The last chapter is devoted to the application of dynamical principles to non-conservative systems. It is especially noteworthy for certain reciprocal relations (Reciprocitätsgesetze) shown to hold between pairs of partial derivatives of the external forces with respect to the corresponding velocities and accelerations, several important physical applications of these relations being cited.

R. S. W.

Social Phases of Education in the School and the Home. By SAMUEL T. DUTTON, Superintendent of Schools, Brookline, Mass. New York, The Macmillan Company. Pp. viii+259. Price, $1.25.

This volume consists of "lectures given during the past two years at Harvard, Chicago and Boston Universities, and papers read before the American Social Science and the National Educational Associations." The author says that "the point of view is in all cases social rather than scholastic, and the ideas emphasized are as worthy of consideration by parents as by teachers." Indeed, the chief value of the book is that it gives a popular interpretation of some current ideas in educational thought. Teachers of all grades will find it helpful and stimulating, and there is enough sound educational theory at the bottom to make it a safe guide to parents.

Mr. Dutton takes as his thesis the idea that the school is a form of social life. Its purpose is to minister to the support of the home and to render service to human society, or to socialize the youth and to fit him to take his place in society and to render the best service of which he is capable. In the thought that "the object of the school is to socialize the child, to make him acquainted with his environment and conscious of his obligations to others," is to be found the clue to Mr. Dutton's educational practice. He believes in emphasizing the 'preparation for vocation' as an aim of the school, because he believes in work—that 'useful activity' which best conserves 'man's physical, moral and spiritnal welfare.' He believes in 'general culture,' the kind that fits one to live more efficiently and helpfully day by day, the kind that makes one a better man or woman and renders one more serviceable. With this idea in mind he looks upon the old school curriculum as meagre and narrowing; he advocates more of physical and manual training and of the domestic and fine arts, "not only because they touch the elemental wants of mankind, but because they connect the school and the home, create a close sympathy between parents, teachers and pupils, and tend to level up whole communities where the less fortunate reside." As for other studies the criterion of excellence must always be the part they play in human life and the service they render to society. This social aim even determines the methods to be employed in teaching—"the governing principle of the recitation should be, not competition, but cooperation;" it should enter into the home life and the management of children in school—"thus, every pupil becomes actively interested not only in being courteous, orderly and helpful himself, but in having his associates combine with him in this social effort." For this reason

the author advocates some form of self-government in home and school, the cooperation of church and school in educational work, the correlation of educational forces in the community, and in the closing chapter he very properly gives an account of the Brookline Education Society and its work—a work in which Superintendent Dutton may well take pride. * * *

Who's Who in America? A Biographical Dictionary of Living Men and Women of the United States, 1899–1900. Edited by John W. Leonard. Chicago, A. N. Marquis and Company. Sm. 8vo. Pp. xxxii + 822. Price, $2.75.

Under the somewhat flippant title borrowed from a useful English publication, Mr. Leonard and his publishers have put forth a notably compact, convenient and scholarly hand-book, at once an autobiographic cyclopedia and a directory of eminent living Americans. The biographic sketches are models of symmetry and condensation, and may be accepted as trustworthy, since the information in nearly all cases was obtained from the persons themselves or from their families, frequently through repeated effort and prolonged correspondence. The delicate and difficult task of selection, or of assorting the 8,602 eminents out of the seventy-odd millions of residuary population, seems to have been performed with great discrimination and fairness, with the assistance of a considerable corps of advisers in special lines of activity. The dictionary-directory is supplemented, and its scholarly air enhanced, by introductory chapters on 'Educational Statistics' and 'Birth and Residence Statistics,' which are real contributions to knowledge of national characteristics; and there is an extended 'Necrology,' in which are listed prominent men and women of America deceased since July 1, 1895. The book-making is admirable for the purpose; the volume is convenient in size and form, distinctive and serviceable in binding, suitable in paper, and well-adapted in typography; while the proof-reading is, in view of the predominance of proper names, remarkably good—the critic for *The Nation* notes but a single error. So, on the whole, the book is as comfortable as it is necessary to those who wish to know something of their contemporaries. The hand-book ought to be particularly helpful to scientists and educators, partly as an up-to-date directory, partly because it gives prominence to distinction in their lines of intellectual activity, perhaps more satisfactorily than any other biographical work extant. Among the few categories of eminents introduced on arbitrary lines are all members of the National Academy of Sciences, and all heads of the larger universities and colleges; and examination of the pages indicates that fully a thousand eminents, or an eighth of the whole, are distinguished for original investigation, frequently combined with teaching, while something like half as many more come in as educators alone. The inclusiveness of the book, as regards scientific men, is indicated by the proportion of entries to the editorial corps of our leading journals of investigation, selected nearly at random: *e. g.*, of the twenty editors and associate editors of Science, and of the eleven of the *American Journal of Science*, all appear in the book; of the ten editors of the *American Anthropologist*, all appear except the one foreign member of the board; of the editorial corps of the *National Geographic Magazine*, twelve out of thirteen appear, and of that of the *American Geologist*, eleven out of twelve; while twelve out of the fourteen American editors of the *Journal of Geology* find place. The educational tabulation is especially suggestive, and the fact that fully half of the eminents were educated in universities and colleges arises as a new argument for thorough education. The distribution of eminence, too, is of much interest. Naturally New York (State) stands first, with 2,039 or twenty-four per cent. of the whole; Massachusetts and the District of Columbia follow almost together, the former with 742 and the latter with 724; Pennsylvania holds fourth place with 622, closely approached by Illinois with 564; then there is a considerable drop to Ohio with 321, followed by New Jersey in the seventh place with 296; then come California with 210, Connecticut with 193, and in the tenth place Missouri with 171; the remaining States with quotas exceeding 100 are Michigan, 144; Mary-

land, 142; Minnesota, 125; Iowa, 121; Indiana, 111; Wisconsin, 108; Tennessee, 105, and Virginia, 102. The comparison between birthplace and present location is equally interesting, illustrating as it does the westward drift, the concentration in States of large cities, and the disadvantage of foreign birth in the race for accomplishment. No occasion for criticising the book appears, though it may be suggested that its convenience might be increased in future editions by printing both the ordinary form of writing the name and the full forename in parentheses, after the manner adopted (but afterward abandoned on pecuniary grounds) by the Joint Commission of the Scientific Societies of Washington, thus: Gordon, Professor J. C. (Joseph Claybaugh). But even without this refinement, the book is admirably complete and convenient.

W J M.

SCIENTIFIC JOURNALS AND ARTICLES.

THE *American Journal of Science* for August contains the following articles:

Rotatory Polarization of Light in Media subjected to Torsion, by A. W. Ewell.

Lichenaria typa W. & S.. by F. W. Sardeson.

Studies in the Cyperaceæ, XI., by T. Holm.

Constitution of Tourmaline, by F. W. Clarke.

Determination of Tellurous Acid in presence of Haloid Salts, by F. A. Gooch and C. A. Peters.

Iodometric Method for the Estimation of Boric Acid, by L. C. Jones.

Method for the Detection and Separation of Dextro- and Levo-rotating Crystals, with Some Observations upon the Growth and Properties of Crystals of Sodium Chlorate, by D. A. Kreider.

Devonian Interval in Northern Arkansas, by H. S. Williams.

Note on a New Meteoric Iron found near the Tombigbee River, in Choctaw and Sumter Counties, Alabama, U. S. A., by W. M. Foote.

Orthoclase Crystals from Shinano, Japan, by C. Iwasaki.

SOCIETIES AND ACADEMIES.

BOTANICAL SOCIETY OF AMERICA.

THE fifth annual meeting of the Society will be held in Columbus, Ohio, August 18 and 19, 1899.

The address of the retiring President, Dr. N. L. Britton, upon the subject: 'Report of Progress of Development of the New York Botanical Garden,' will be given in the Chapel, University Hall, Friday evening at 7:30 o'clock. The lecture will be illustrated with lantern views. On the following day, Saturday, the regular sessions for the reading of papers will be held in Room 17, Townshend Hall, at 10 a. m. and 2 p. m. The following papers are already announced for the meeting, and others are to be expected when the full program is made up by the Council.

'Apetaly and Diœciousness,' Charles Edwin Bessey.

'The Spore Mother Cells of Anthoceros,' Bradley Moore Davis.

'Symbiosis and Saprophytism,' Daniel Trembly MacDougal.

'The Effect of Centrifugal Force upon the Cell,' David Myers Mottier.

'The American Species of Arisæma,' Nathaniel Lord Britton.

'The Uredineæ occurring upon Phragmites, Spartina and Arundinaria in America.' Joseph Charles Arthur.

'Some notes upon Distribution of American Erysipheæ,' Byron David Halsted.

'Gametes and Gametangia of the Phycomycetes,' Bradley Moore Davis.

The first meeting of the Council will occur at 2:00 p. m., at the Chittenden Hotel, and the first business meeting, according to custom, at 4:00 p. m., in Townshend Hall, Room 17. A business meeting for the election of officers and new members and for the transaction of other business will be held at 9:30 a. m., Saturday.

GEO. F. ATKINSON,
Secretary.

DISCUSSION AND CORRESPONDENCE.

ANAGLYPHS AND STEREOSCOPIC PROJECTION.

AFTER an enthusiastic period some twenty odd years ago the interest in stereoscopic views suffered a reaction. The interest has been lately reawakened in many ways. In SCIENCE Professor Jastrow has already discussed some stereoscopic methods; in SCIENCE for July 14th of this year Mrs. C. Ladd Franklin makes special mention of pictures printed in two colors and urges the adoption of a method of stereoscopic projection. The following account may, perchance, contain some minor bits of information not already well known.

1. The color method of printing stereoscopic pictures was invented by L. D. du Hauron, of Algiers. Two blocks, *e. g.*, half-tone plates, are made from a pair of pictures taken in the usual way with the stereoscopic camera. The picture taken with the right-hand lens is printed in red ink on paper, that with the left-hand lens in blue ink directly over it. The result is a blurred picture. When this blur is viewed through a pair of spectacles consisting of blue glass for the right eye and red glass for the left eye the two pictures reach the eyes separately and appropriately. This occurs because to the eye looking through the blue glass the white paper and the blue printing appear—practically—an even blue background, while the red appears as a black picture; similarly, to the eye with red glass the blue print appears as a black picture on a red ground. These two pictures, reaching the brain separately, are there combined into a picture in three dimensions showing apparently a solid view in wavering purple light. The peculiar wavering light is the result of fluctuating binocular mixture and binocular strife.

The pictures have been sold as 'anaglyphs' for a number of years by the Comptoir Suisse de Photographie at Geneva. A few years ago they were sold by a Philadelphia agent and were marked 'Patent 8,20,95.' This is the patent-grant 544,666 of August 8, 1895, which states that the article was patented in France in 1891.

A peculiar effect arises from twisting the picture or the head while observing these pictures; the objects in the relief figure appear to move relatively to each other.

2. The projection of stereoscopic pictures by a double lantern is not so unknown in America as Mrs. Franklin supposes. In the fall of 1895 I had occasion to deliver a public lecture on vision and, not knowing how to do anything with binocular vision without some such method, I hit upon the idea of throwing the two parts of stereoscopic views on the screen in red and green lights and giving bits of red and green glass to the audience. The method proved a complete success at a lecture in the Brooklyn Institute. Since then it has been in regular use in my laboratory for studying the laws of binocular vision. I have, however, no claims to credit for the fundamental idea of the method. Some photographer seems to have previously projected two pictures in a similar way; the details of his process have not been accessible to me. The whole method was described and various technical hints were given in the *Scientific American*, 1895, LXXIII., 327. This method is now used by several colleges. A Philadelphia firm (Williams, Brown & Earle) is preparing to furnish the materials and a carefully selected set of slides to illustrate scientific and educational subjects. The equipment is so inexpensive for any one possessing a double lantern that the cost is hardly worth considering.

3. There is still another method of stereoscopic projection which is in some ways superior to the red-green method. The two pictures are thrown by two beams of white light, polarized at right angles, on to a corrugated silvered screen and are viewed by an eye glass composed of two analyzers at right-angles. As the inventor of this method, John Anderton, of Birmingham, England, was kind enough to donate a complete outfit to the Yale Laboratory, we have had the opportunity to use it regularly for instruction. The method is superior to the red-green method in projecting both pictures in white light, and the cost is not excessive. A complete description of it has been given in my 'New Psychology,' p. 423.

4. It may be technically justifiable to call the results of stereoscopic union by the term 'pictures in three dimensions,' but it is psychologically incorrect. The view seen by stereoscopic projection is—to the observer—the real thing. There is no picture effect about it when the thing is properly done; the relief and solidity of the objects appear just as real as in the case of real objects. Of course, it is physically impossible to have a group of exotic palms where the screen and lecture table were standing a moment ago, and the group seen lacks coloring. These factors give a slight unreality to such a stereoscopic view; the observer feels as though he were looking at a model. In the case of statuary or other objects where color is lacking or subordinate the reality is perfect; to

the observer ten feet or more from the screen there is no inferiority in the sensation he receives. In the case of ordinary stereoscopic views the reality is lessened by the small size; an ordinary view looks like a view into a model, but a view in life-size is a real matter. Curiously enough, a view larger than life-size is singularly impressive and fascinating.

The advantage is surely very great in getting a whole museum of statues or of natural history specimens, in keeping the collection in a single case, and in being able to show them at any moment by merely turning on the switches or stop-cocks of a double lantern.

E. W. SCRIPTURE.

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YALE UNIVERSITY, NEW HAVEN, CONN.

POT-HOLE VS. REMOLINO.

TO THE EDITOR OF SCIENCE: Something more than formal advocacy of a word is usually necessary for its adoption; it must survive by its own fitness. In so far, however, as individual recommendations may have weight I may say that I am in favor of Mr. O. H. Hershey's suggestion that the word remolino be used in place of pot-hole.

The objections to the use of the word remolino raised by Mr. F. F. Hilder in SCIENCE of July 21st do not seem to me to be well founded. Is it true that "the term pot-hole expresses the object to which it is applied more correctly than the Spanish word?" While the term may have been applied on account of the shape of the holes, it is more likely that it gained its use from a common belief that the holes were excavated by the Indians for cooking purposes. If this be the case the word pot-hole is more misleading than remolino, for the latter, at least, gives a correct suggestion as to the way in which the holes have been formed.

Again, in which sense can it be said that the word remolino is incorrectly used by the people of Colombia? Are such words as villain, charity and many others incorrectly used by us because we do not employ them in their original significance? Had the compiler of the Spanish dictionary in which Mr. Hilder sought the definition of the word remolino known of its use by the people of Colombia as a name for a rounded rock cavity made by an eddying current of water he would probably and very properly have given that in his list. Would the critic of nomenclature have then thought it incorrectly used?

OLIVER C. FARRINGTON.

FIELD COLUMBIAN MUSEUM, CHICAGO.

NOTES ON INORGANIC CHEMISTRY.

AN interesting paper on the cause of color in minerals by L. Wöhler and K. v. Kraatz-Koschlau has appeared in *Tschermak's Mitteilungen*. While many minerals are colored by organic substances, the quantity is too small for identification. In several cases, as in zircon and smoky quartz, the presence of nitrogen was proved, and from bases in celestine from Gembeck three different double platinum salts were obtained. Contrary to the view of Nabl, the coloration of amethyst is not due to ferric thiocyanate, as no sulfur is present.

The difficulty of identifying the inorganic coloring materials of minerals is no less than that of organic; indeed, it was found necessary to use synthetic processes exclusively. Chromium is the cause of color in many minerals. In the case of chrome garnets, chrome spinel, chrome diopside this is apparent, but is no less true in red and violet spinel, ruby, sapphire, oriental amethyst, green zircon and topaz from Villarica. It was not found possible to detect the chromium in ruby and sapphire, but on fusing alumina and barium fluorid with one-fifth per cent. of potassium bichromate the crystals of alumina obtained were chiefly colorless, but red, blue, yellow and green crystals were also found. From the color differences it is probable that the chromium is present in different oxydation stages. It was not found possible to color alumina by iron, even at very high temperature. In the Villarica topaz no trace of manganese was present. Wulfenite and vanadinite are also probably colored with chromium, though organic matter is also present. While titanic acid, and hence pure rutile, is colorless, the sesqui-oxid gives a dark brown color; hence the color of ordinary rutile is due to partial reduction of the titanic acid, a red tint being in part due to the presence of iron. The color of chrysoprase is due to the presence

of some organic compound of nickel. The color of the yellow barite of Cumberland is caused by a hydrated ferric oxid. While some of the conclusions of the article may not be as certain as the authors believe, it is one of the best worked-out papers which has appeared on the subject.

A careful study of the precipitated sulfids of antimony is given by Otto Klenker in the *Journal für praktische Chemie*. The precipitate by hydrogen sulfid from solutions of quinquivalent antimony varies in color from light or dark brown to red and orange; from acid or neutral solutions it is flaky, settles easily and when dry is electric and not hygroscopic; from alkaline solutions it is fine and does not settle, when dry is very hygroscopic but not electric. Its composition is always variable, being a mixture of Sb_2S_5, Sb_2S_3 and free sulfur. From a strongly alkaline solution no Sb_2S_5 is precipitated, but this increases until a maximum of Sb_2S_5 (over 95%) is present when the solution contains 12% free hydrochloric acid. If the acid increases above this the amount of Sb_2S_5 diminishes owing to its solubility in strong hydrochloric acid. In a hot acid solution no Sb_2S_5 is formed, differing thus from quinquivalent arsenic solutions which are completely precipitated as As_2S_5 from hot acid solutions. When the mixed precipitate of antimony sulfids and sulfur is dissolved in caustic soda the reaction for trivalent antimony is not given with ammoniatal silver solution, as the alkaline solution of mixed Sb_2S_3 and S_2 acts as Sb_2S_5. On the other hand, if the free sulfur is previously removed with carbon bisulfid the reaction is obtained. Sb_2S_5 is, however, not decomposed appreciably under 100° by carbon bisulfid or any other solvent of sulfur.

Paul Bourcet has proposed in the *Comptes Rendus* a new method for the estimation of iodin in organic matter, which consists in fusing the substance with caustic potash, neutralizing with sulfuric acid and freeing from other salts by repeated precipitations with alcohol. The iodin is liberated in the presence of carbon bisulfid by nitrous acid vapors and estimated colorimetrically. The quantity of iodin in a large number of different kinds of fish was determined and found to vary from nearly two milligrams per kilo in *clupea harengus*, and 1.4 mg. in *salmo salar*, down to 0.3 mg. in *merlangus vulgaris*, *scomber scombrus*, *esox lucius*, 0.2 mg. in *raia clavata*, and 0 1 mg. in *truita marina*.

In the course of investigations on the effect of low temperatures upon steel it has been found by F. Ormond that nickel steels, if non-magnetic to begin with, acquire magnetic properties after five minute's immersion in liquid air. If most of the nickel is replaced by manganese the same is true. Carbon steel with 1.4 to 1.6 per cent. carbon, after being immersed in liquid air and then brought back to ordinary temperature, is found to be profoundly modified. There is an increase in magnetic permeability and in permanent magnetism, and the density is decreased from 7.798 to 7.692. The polish upon a surface disappears.

J. L. H.

BOTANICAL NOTES.

SPRUCE AND PINE FORESTS OF WEST VIRGINIA.

In an interesting bulletin (No. 56) of the West Virginia Experiment Station, Professor Hopkins reports the results of an investigation of the cause of the unhealthy conditions of the spruce and pine of that State, and incidently gives us a good deal of information regarding its spruce and pine forests. The spruce (apparently *Picea rubens* Sargent) is a tall, straight tree, two to three feet in diameter, and more than one hundred feet in height. It is abundant at and above 3,000 feet above sea level, and is seldom found below 2,300 feet, and reaches its highest development in the region about the headwaters of the Cheat, Valley, Greenbrier, Elk and Gauley Rivers. In this region it commonly grows on a soil which is described as "little else than a mass of broken stones, which is literally filled with water at all seasons of the year." After studying the problem carefully, Professor Hopkins concludes that the area originally covered by spruce forests included all of the higher elevations of the Appalachian range that rise above 2,400 feet, or, in other words, about 2,000,000 acres, and on this area 'one-half of the timber was probably spruce.' The author discusses the reduction of this original forest area, and concludes that "the

total merchantable spruce timber now standing would not be equivalent to much over 225,000 acres of pure spruce forests, averaging 15,000 feet of lumber to the acre."

The pines of the forests of the State are five in number, as follows: White Pine (*Pinus strobus*), widely distributed over the State; Yellow Pine (*Pinus echinata*), in the eastern, southern and western sections of the State; Pitch Pine (*Pinus rigida*), widely distributed over the State; Scrub Pine (*Pinus virginiana*), growing where other pines will not thrive; Table Mountain Pine (*Pinus Pungens*), common in old highland fields and on the mountains and foothills of Hampshire, Grant, Mineral and Pendleton counties. "It is evident," the author says, "from available records and present indications that at one time, possibly not later than 250 years ago, the predominating forest trees over large areas in the southwestern third of the State, as well as in the southern and eastern sections, were pine, and that the isolated forests, and the groups and individuals of the white, yellow, pitch, scrub and table mountain pines that we find at present, are living examples and lineal descendants of extensive primitive forests of one or more of the species mentioned." As illustrating the rapid destruction of the forests, the author says, further: "In the present pine areas of the State I would judge that ninety per cent. of the merchantable pine timber has been removed or has died."

STUDIES OF THE SPECIES OF EUPHORBIA.

IN a recently published paper issued by the Missouri Botanical Garden, Mr. J. B. S. Norton revises the North American species of *Euphorbia* of the Section *Tithymalus* occurring north of Mexico. No general work on the North American species of the Section *Tithymalus* has appeared since Boissier's monograph of the genus as a whole in De Candolle's 'Prodromus,' published in 1862, although a number of new species have been described. Engelmann, and recently Millspaugh, studied the genus in this country, but the section under consideration sadly needed revision at the time Mr. Norton took it up, two and a half years ago, at the suggestion of Dr. Trelease. As a result of Mr. Norton's studies, we have here an arrangement and description of thirty-six species and twelve varieties, accompanied by forty-two well drawn plates. It is encouraging in these days of species-making to find that although the author is working over a group which has not undergone revision for thirty-seven years he separates but one new species! When it comes to varieties he is able to get along with but seven new ones, and he calls them *varieties* and not *species*. Such caution in the treatment of species and varieties is to be most heartily commended, and we should be glad to see much more of it in the work of monographers. The author follows Boissier's system of classification with little modification, and appends a diagram showing his ideas as to the relationship of the species. He makes no attempt to revise our notions as to the morphology of the flowers and flower-clusters, accepting these as ordinarily treated in standard works.

BOTANY IN IOWA.

THE Sixth Volume of the Proceedings of the Iowa Academy of Sciences (1898) contains nine botanical papers, as follows: 'Preliminary Report on the Diatoms of Iowa,' by P. C. Myers, being a general paper on collecting these plants; 'Report on a Fossil Diatomaceous Deposit in Muscatine County, Iowa,' by P. C. Myers, cataloguing fourteen species; 'Diatomaceous Earth in Muscatine County,' by J. A. Udden, describing the locality of the preceding deposit; 'Forest Trees of Adair County, Iowa,' by J. E. Gow, illustrated by a map, and including a catalogue of thirty-one species, several of which are mere shrubs, as Dogwood (*Cornus paniculata*), Sumac (*Rhus glabra*), Elderberry (*Sambucus canadensis*), Hazel (*Corylus americana*), Wild Grape (incorrectly given as *Vitis Aestivalis* instead of *V. vulpina* of Linnæus, or *V. riparia* of the older manuals); 'Effects of a Sleet Storm on Timber,' by J. E. Gow, accompanied by photographs of injured trees; 'The Iowa Liverworts,' by B. Shimek, giving a list of twenty-one species; 'A Preliminary List of the Mosses of Iowa,' by T. E. Savage, being an annotated list of seventy-eight species; 'Additions to the Bibliography of North American Lichens', by Bruce Fink, including ninety-five titles; 'The Flora of

Southern Iowa,' by T. J. and M. F. L. Fitzpatrick, including a catalogue of several hundred species of flowering plants and ferns.

CHARLES E. BESSEY.

UNIVERSITY OF NEBRASKA.

THE SCHOOL OF GEOGRAPHY AT OXFORD UNIVERSITY.

THE recent founding of a School of Geography at Oxford University is an event of more than passing interest to the educational and scientific world, and deserves a word of comment on this side of the water. The Royal Geographical Society has long deplored the lack of opportunity for geographical training in Great Britain and has been endeavoring to get geography properly recognized in both university and school. Over fifteen years ago the present Secretary of the Society, Dr. J. Scott Keltie, made a careful study of the status of geography teaching in the schools of Great Britain, and published a complete report that has been of great and permanent value. For the last few years readers have been maintained in Geography at both Oxford and Cambridge, largely through the efforts of the Society. At the same time, at the Society's rooms, training has been giving to prospective travellers in the art of surveying and in the other scientific lines of value to all explorers. The success of these various lines of work has led to the establishment of the School at Oxford, under the joint auspices of the Society and the University. Each institution will contribute £400 annually, and the management of the School will be vested in a committee, consisting of the Chancellor *ex-officio*, of three nominated by the Council of the Royal Geogragraphical Society and three nominated by the Delegates of the Common University Fund.

The School will start with a staff of four members, consisting of the present Reader, Mr. H. J. Mackinder, M.A.; the Assistant to the Reader, Andrew J. Herbertson, Ph.D.; a Lecturer in Physical Geography, Mr. H. N. Dickson, F.R.S.E., and for the year 1899–1900 a Lecturer in Ancient Geography, Mr. G. B. Grundy, M.A.

The work of the School will include a course in systematic instruction primarily intended for graduates and other advanced students, with demonstrations and practical work in physical geography, cartography and surveying. Courses of lectures will also be given with special reference to the historical and scientific teaching in the University.

Sir Clements Markham, in his annual address to the Royal Geographical Society, spoke at length in reference to the project and outlined a large field of results to come from the increased opportunities in geographical training. He particularly emphasized the fact that the School would be open to all, whether attached to the University or not.

It is to be hoped that the enterprise may succeed abundantly, and certainly it is fitting that the leading commercial nation of the world should undertake to give its young men training in an important branch of education, whether in preparation for business or political life. The importance of geography in commerce has long been recognized by certain leaders in Great Britain, but the necessary steps for bringing about commercial progress through increased geographical training have been too long deferred. This School is the only one in Great Britain and should fill a long standing need. With the opportunities at Bruxelles and at Oxford, both of which have recently been established, geography has received a recognition that ought to be a lesson to this country, especially to the authorities of our many large universities that have no chairs in this science.

R. E. D.

SCIENTIFIC NOTES AND NEWS.

DETAILS have reached us in regard to the approaching meeting of German men of science and physicians, which will be held at Munich, from the 17th to the 23d of September. The Congress will be divided into no less than thirty-seven sections, of which seventeen are in the natural sciences and twenty in medicine. There will be two general sessions of the whole Congress, at each of which three lectures will be given. These will be 'The Results of My Expedition to the North Polar Regions,' Dr. Fritjof Nansen; 'Radiography in the Treatment of Surgical Diseases,' Professor von Bergmann; 'The Change in the Astronomical View

of the World during a Century,' Professor Foster; 'Science and Medicine,' Professor Birch Hirschfeld; 'The Recent Development of the Methods of Theoretical Physics,' Professor Boltzmann; 'Justus von Liebig and Medicine,' Professor Klemperer. There will also be a special session of the scientific sections, at which Dr. Chun will describe the exhibition of the results of the German deep-sea expedition, and Professors Bauschinger, Mehmke and Schülke will discuss 'The Decimal Sub-division of Time and Angles.'

THE program of the seventh annual meeting for the Society for the Promotion of Engineering Education, which meets at Columbus on August 17th, 18th and 19th, gives the titles of seventeen papers that will be presented. The Council meets at 9 o'clock on the morning of Thursday, 17th; and at 10 o'clock, after a business meeting, the President, Dr. T. C. Mendenhall, will give the annual address.

THE American Microscopical Society will hold its annual meeting at Columbus in the week preceding the meeting of the Association, namely, on August 17th, 18th and 19th. The Executive Committee will meet on the 17th, Thursday, at 10 o'clock in the morning, at the Park Hotel, which is to be the headquarters of the Society. The general sessions will be held at the University, the address of the President being given on Thursday evening. On Friday afternoon there will be a conference on the use of the microscope and the teaching of botany, zoology, physiology and bacteriology.

THE party of men of science who have been in Alaska as the guests of Mr. Harriman arrived at Portland, Ore., on August 2d. Those from the East have reached home by a special train on the Oregon Railway & Navigation Company.

MR. H. BLODGETT, B.S., has been appointed assistant botanist and entomologist in the New York Branch Agricultural Station at Jamaica, L. I.

CAPTAIN CAMPBELL M. HEPWORTH has been appointed marine superintendent in the British Meteorological Office, in succession to the late Mr. Baillie.

IN the death of Mrs. Arvilla J. Ellis, of Newfield, New Jersey, on July 18, 1889, there passed away another of those patient workers to whose fidelity science owes so much. Not known as a botanist, not a member of a scientific society, not the author of a scientific paper, she nevertheless contributed more to the advancement of our knowledge of the fungi than many of those whose names are frequently appended to scientific articles in the journals. Many years ago she began aiding her husband, Mr. J. B. Ellis, in the arduous labor of preparing and mounting the specimens for the 'North American Fungi,' and later for the 'Fungi Columbiani,' and with her own hands bound the books in which these were delivered to subscribers. Had it not been for her help the first of these great distributions—numbering 3,600 specimens—would have been suspended early in its history, and the second—numbering 1,400 specimens—would never have come into existence. To her deft fingers, which wrought so patiently, botanical science is indebted for the more than two hundred thousand specimens of the fungi which Mr. Ellis distributed to the botanists of the world.

THE death is announced, at the age of seventy-five years, of M. Balbiani, professor of embryology at the Collège de France; of Professor Pasquale Freda, Director of the Station for Agricultural Chemistry at Rome; of Dr. S. T. Jakčič, professor of botany and director of the botanical gardens, Belgrade, and of Dr. Carl Kuschel, formerly professor of physics at the Polytechnic Institute at Dresden.

MR. F. W. HODGE, with the assistance of Mr. A. C. Vroman, is engaged in photographing the Prince collection of Amerind idols in Santa Fé for the Bureau of American Ethnology. This collection, made by Governor L. Bradford Prince through several years of effort, has attracted much attention from archæologists, partly by reason of the unique and puzzling character of the effigies.

WE learn from the *American Geologist* that Mr. E. S. Riggs, of the Field Columbian Museum, assisted by Mr. H. W. Menke, is in Wyoming, collecting fossil reptiles for the institution.

MR. J. B. MARCOU and Dr. Philippe Marcou, the heirs of the late Jules Marcou,

presented sometime since to the American Museum of Natural History his geological library, numbering about 3,000 volumes, 10,000 pamphlets and 1,200 maps. This is one of the largest libraries of its kind in the world, and gives the Museum the most complete collection of books on paleontology and geology in America.

Dr. Jules Maringer, who died on May 13th, left the sum of 100,000 fr. to the Pasteur Institute, Paris.

There are several vacancies in the Coast and Geodetic Survey which are to be filled by Civil Service examinations. The most important of these is the position of Inspector of Standards, for which the examination will be held on October 28th. It will consist of training, especially original investigation and published papers in physics and an essay on the functions of a National Office of Weights and Measures. On September 5th and 6th an examination for two minor positions will be held in the same Survey, that of Computor at a salary of $1,000, and of Aid at a salary of $720.

Some time ago, as we learn from the *British Medical Journal*, a sum of £2,000 was handed to General Donny by a donor who wishes to remain anonymous, to be applied in furtherance of the study of 'colonial pathology.' A committee of the Société d'Etudes Coloniales, Brussels, appointed to consider the best manner of utilizing the gift, decided to employ the money in equipping a scientific mission to proceed to the Congo State and study the diseases of hot countries in that region. Dr. Van Campenhout, an army medical officer who had already been twice on duty in the Congo, and Dr. Reding were selected for the service. After long preparation they embarked on June 29th. The Congo State has established at Leopoldsville a physiological and bacteriological laboratory, in which the work will be carried out. The same committee has offered two prizes, each of the value of £100, to be awarded (1) to anyone who shall considerably advance any knowledge of Laveran's hæmatozoon within and without the human body, and (2) to anyone who shall determine the real origin of hæmoglobinuric bilious fever.

UNIVERSITY AND EDUCATIONAL NEWS.

Arrangements have been finally made by which the London University, which, it will be remembered, is only an examining body, will be removed from Burlington Gardens to the Imperial Institute. In return for rooms in the Institute the government will pay the existing mortgage on the building of £40,000 and discharge a floating debt of the Institute not to exceed £15,000. The necessary structural alterations will be undertaken at once.

The Russian Minister of Public Instruction has issued a proclamation, by order of the Tsar, to the effect that all students who took part in the disorders last year are pardoned, excepting those who are entirely excluded from attending the high schools. Part of the students will return this month and part in August, 1900.

It is expected that a technical school will be established at Toronto, the government having offered an annual grant of $3,000 for maintenance, provided that the city erect a building at a cost of at least $100,000.

Francis Ramaley, Ph.D., University of Minnesota, has been appointed professor of biology in the University of Colorado, at Boulder, in succession to Professor John Gardiner, who has retired on account of continued ill health, having held the chair since 1889.

Professor C. S. Prosser, of Union College, Schenectady, New York, has been elected associate professor of historical geology at Ohio State University, Columbus.

Mr. W. Somerville, professor of agriculture and forestry at the College of Science, Newcastle-on-Tyne, has been elected to the newly-established chair of agriculture at Cambridge University.

Professor C. W. Röntgen, of Würzburg, has recived a call to the University of Munich.

Professor R. Abegg has been elected Associate Director of the Chemical Institute at Breslau.

Dr. Ernst Ebermeyer, professor of forestry at the University of Munich, has retired.

Yours resp'ty

D. G. Brinton